

Amendments to the Claims

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1-8. (cancelled)

9. (original) A computer readable storage medium having stored data representing instructions executable by a computer to monitor a catalytic device coupled in an exhaust of an internal combustion engine of a vehicle, said storage medium comprising:

instructions for operating the engine lean;

instructions for ending said lean operation when an amount of NO_x stored in the catalyst approaches a maximum capacity for NO_x storage;

instructions for determining a lean operation time;

instructions for operating the engine rich after said lean operation is ended;

instructions for ending said rich operation when stored NO_x is released based on a downstream air-fuel sensor;

instructions for determining a rich operation time;

instructions for correcting said rich operation time based on a level of richness during said rich operation and an exhaust gas flow rate during said rich operation;

instructions for correcting said lean operation time based on a NO_x concentration during said lean operation and an exhaust gas flow rate during said lean operation;

instructions for determining a ratio between said corrected lean time and said corrected rich time; and

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instructions for determining degradation of the catalyst based on said ratio.

10. (original) The medium of claim 9, wherein said instructions for ending said lean operation further comprise instructions for ending said lean operation when an estimated amount of NOx stored in the catalyst approaches said maximum capacity for NOx storage.

11. (original) The medium of claim 9, wherein said instructions for determining degradation of the catalyst based on said ratio further comprise:

instructions for retrieving a stored expected ratio as a function of operating conditions;
and

comparing said expected ratio to said determined ratio to determine degradation of the catalyst.

12. (original) The medium of claim 11, wherein said stored expected ratio is stored as a function of said lean time.

13. (currently amended) The medium of claim ~~[[1]]~~ 9, further comprising:

instructions for correcting said rich operation time based on a level of richness during said rich operation and an exhaust gas flow rate during said rich operation;

instructions for correcting said lean operation time based on a NOx concentration during said lean operation and an exhaust gas flow rate during said lean operation; and

instructions for determining said ratio between said corrected lean time and said corrected rich time.

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14. (original) A computer readable storage medium having stored data representing instructions executable by a computer to monitor a catalytic device coupled in an exhaust of an internal combustion engine of a vehicle, said storage medium comprising:

instructions for operating the engine lean;

instructions for ending said lean operation based on a NOx sensor coupled downstream of the catalyst;

instructions for determining a lean operation time;

instructions for operating the engine rich after said lean operation is ended;

instructions for ending said rich operation when stored NOx is released based on a air-fuel sensor coupled in the exhaust;

instructions for determining a rich operation time;

instructions for correcting said rich operation time based on a level of richness during said rich operation and an exhaust gas flow rate during said rich operation;

instructions for correcting said lean operation time based on a NOx concentration during said lean operation and an exhaust gas flow rate during said lean operation;

instructions for determining a ratio between said corrected lean time and said corrected rich time;

instructions for retrieving a stored expected ratio as a function of said corrected lean time;

instructions for comparing said ratio to said expected ratio; and

instructions for determining degradation of the catalyst based on said comparison.

15. (new) A method to monitor a catalytic device coupled in an exhaust of an internal combustion engine of a vehicle, comprising:

operating the engine lean;

ending said lean operation when an amount of NO_x stored in the catalyst approaches a maximum capacity for NO_x storage;

determining a lean operation time;

operating the engine rich after said lean operation is ended;

ending said rich operation when stored NO_x is released based on a downstream air-fuel sensor;

determining a rich operation time;

correcting said rich operation time based on a level of richness during said rich operation and an exhaust gas flow rate during said rich operation;

correcting said lean operation time based on a NO_x concentration during said lean operation and an exhaust gas flow rate during said lean operation;

determining a ratio between said corrected lean time and said corrected rich time; and

determining degradation of the catalyst based on said ratio.

16. (new) The method of claim 15, wherein said ending said lean operation further comprises ending said lean operation when an estimated amount of NO_x stored in the catalyst approaches said maximum capacity for NO_x storage.

17. (new) The method of claim 15, wherein said determining degradation of the catalyst based on said ratio further comprises:

retrieving a stored expected ratio as a function of operating conditions; and

comparing said expected ratio to said determined ratio to determine degradation of the catalyst.

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